NEW HYPSOMETRIC MAP OF THE RUSSIAN EMPIRE.

Lieut. Col. Jules de Shokalsky, president of the Imperial Geographical Society of St. Petersburg (now Petrograd), has just sent us copies of his beautifully shaded and lithographed hypsometric map of the Russian Empire,[1] which presents the general topographic features of the empire by means of 15 shades among the three colors blue, green, and brown—and on a scale of 1:12,600,000 or, about 200 miles to the inch.

The gigantic proportions of the Empire and the lands falling under its influence are admirably impressed upon the reader of this chart. Extending from the longitude of Berlin and Copenhagen on the west (about 18° W. of Pulkova) to Bering Strait on the east (about 160° E. of Pulkova), from Franz Josef Land (80° N.) on the north to the latitude of Korea and Peshawar (about 34° N.) on the south, this chart embraces an area almost double that of the United States and with as great a variety of topography.

The use of a deep green for those land areas below mean sea level about the Caspian Sea, of lighter greens for areas between sea level and 500 meters above, together with 7 shades of brown for altitudes between 500 meters and the summits of the Himalayas, is in accord with international usage and serves to develop the pronounced hypsometric contrasts of the Empire. Americans will be surprised to find such a large percentage of the total area lying below 500 meters (1,640 feet) above sea level; from the Baltic to Rasnoŝarsk, or over a stretch of 70° of longitude along the parallel of 60° N., the Trans-Siberian Railway does not exceed this altitude save for the short crossing of the Urals (about 500 meters) at Ekaterinburg.

As a whole, the map is not unduly loaded with place names (those given are in Russian), and the general effect of the above colors, together with five shades of blue indicating the topography of the ocean floor, is very pleasing. The only disturbing feature of the map is the heavy double black line showing the courses of the single-track Russian railroads. Many also will find it inconvenient to have to correct the published longitudes in order to bring this map with its 0° meridian at Pulkova into harmony with the standard Greenwich meridian; but when consulting this map alone it is also a convenience to have the meridians numbered from a prime meridian that is shown on the map itself.

All students of Asiatic meteorology, climatology, and geography will find this map an indispensable aid in securing a proper idea of the topographic features which are such an important factor in determining the weather, climate, and human activities of the great Slavic Empire and its Mongolian neighbors. We all owe the skilled and indefatigable compiler our thanks for this convenient map, and it is to be hoped that an English edition of this chart may soon appear in equal perfection.—C. A. jr.

[1] Carte hypsométrique de l'Empire Russe. Essai de représentation du relief de l'Empire, par J. de Schokalsky. Échelle, 1:12,600,000. Size, between neat lines, 46.3×68.1 cm. (18¼×26¾ inches). Lithographed in 4 colors.

THE HOTTEST REGION IN THE UNITED STATES.

Under this caption we presented in the June, 1915, REVIEW an interesting article by Mr. George H. Willson, wherein the statement is made that the highest temperature at Greenland ranch, Death Valley, Inyo County, Cal., was 134° F. We have just received through Mr. Willson the following statement by F. W. Corkill, mill superintendent of the Pacific Borax Co.:

> Regarding the temperature of 134°F., which was recorded [at the Greenland ranch] on July 10, 1913, I will state that this record should be considered correct. I remember the day very distinctly, as a man by the name of Busch perished in the valley north of the ranch that day on account of the heat. I do not know in which direction the wind was blowing on that day, but it was blowing very hard from either the north or the south. The chauffeur who was with Mr. Busch at the time he perished also very nearly lost his life. I saw him a few days later and he said that a terrific wind prevailed in the valley on that day.

RELATION BETWEEN DEPARTURES FROM THE NORMAL IN THE STRENGTH OF THE TRADE WINDS OF THE ATLANTIC AND THOSE IN THE WATER LEVEL OF THE NORTHERN EUROPEAN SEAS.[1]

By P. H. GALLÉ.

[Reprinted from Science Abstracts, Sec. A, June 25, 1915, § 649.]

Mean values from Norwegian, Dutch, German, and Finnish tide gages disclose an annual periodicity in the water level of the North Sea and Baltic showing a minimum in spring and a maximum in autumn, with an amplitude of about 18 cm. The author considers it probable that these fluctuations are caused by fluctuations in the strength of the North Atlantic current, which itself is a branch of the Gulf Stream. There is evidence that fluctuations in the strength of the Gulf Stream are closely associated with changes in the strength of the trade winds, and as observations of the trade winds are more numerous than current observations, an attempt is made to ascertain the correlation between the North Sea water level and the trade-wind strength. Curves showing the annual variations of these two elements lend support to the theory that monthly fluctuations in the strength of the northeast trade winds are responsible for the monthly fluctuations in the water level of the North Sea and Baltic, there being a time lag of about two and one-half months in the action. In addition to this effect by the distant trade winds it is found that the local winds in the neighborhood of the entrance to the Baltic from the North Sea also produce some effect on the water level.—*J. S. Dines.*

[1] See Proc., K. Akad., Amsterdam, Apr. 23, 1915, 17:1147-1158.

THE ROBINSON ANEMOMETER.[2]

By K. SCHREBER.

[Reprinted from Science Abstracts, Sec. A, June 25, 1915, § 650.]

The results of experiments to determine the constants of a small cup anemometer (cups, 38 mm. in diameter; arms, 45 mm. long) are described. The anemometer was mounted in the center of a box 35×35×50 cm. in dimensions, of which one end was open, while the opposite end could be opened or closed at will. The box was placed in the middle of the wind channel of the Aerodynamical Institute at Aachen, and arrangements were made for recording automatically the time at which each revolution, or, if desired, each quarter revolution, of the cups was completed. In order to determine the constants of the anemometer, the following general relation between the angular velocity ω of the cups and the velocity v of the air passing them was taken, it being assumed that the quantities a, b, c, d, e, and f are constants of the instrument, independent of v and ω—

$$d\omega/dt = a + b\omega + cv + d\omega^2 + ev\omega + fv^2.$$

[2] See Meteorol. Ztschr., August, 1914, 31:373-380.

In order to determine the constants, two sets of experiments were carried out. In the first set the cups were made rapidly to rotate by opening the movable lid of the box and passing an air current through the wind channel; then the lid was suddenly closed, thus making v zero, and the motion of the cups was recorded from that instant until the cups came to rest. The general equation reduces to—

$$d\omega/dt = a + b\omega + d\omega^2.$$

The constants a, b, and d were determined from the results of the experiments. In the second set of experiments, the cups being initially at rest and the lid closed, a *constant* current was passed along the channel. The lid was then opened, and the motion of the cups began to be recorded from that instant. The general equation

$$d\omega/dt = (a + cv + fv^2) + (b + ev)\omega + d\omega^2$$

could be written

$$d\omega/dt = a' + b'\omega + d\omega^2,$$

where a', b' are constants depending on the constant velocity, an equation similar to the preceding. In this way all the constants of the general equation could be deduced, and the final result is

$$(t+4.9)d\omega/dt = -1.76 - 0.667\omega + 0.50v - 0.098\omega^2 + 0.140\omega v + 0.84v^2.$$

The interesting case for meteorologists is that of the steady state when $d\omega/dt$ is zero, and the anemometer is rotating uniformly with angular velocity ω in a steady wind velocity of v. The relation between ω and v is then found by equating the right-hand side of the equation to zero. For values of v greater than 3 meters per second the solution reduces approximately to $v = 0.90 + \omega/3.74$, which gives a linear relation between the wind velocity and the rotation of the cups.—*R. Corless.*

REPORT OF THE WORK CARRIED OUT BY THE STEAMSHIP "SCOTIA," 1913.[1]

By G. I. TAYLOR.

[Reprinted from Science Abstracts, Sec A, June 25, 1915, § 653.]

* * * D. J. Matthews [hydrographer to the expedition] obtained full observations dealing with the bathymetry, salinity, temperature, and ocean currents of the area, and noted the position of all the ice observed. The observations indicate the conditions at the boundary of the cold, relatively fresh and slow-moving Labrador current which flows southward and southeastward from Davis Strait into the Atlantic, and the warm, saline and more rapidly-flowing Gulf stream, which flows across the path of the Labrador current from west to east and compels the latter to dive below.

Taylor's report [of the meteorologist] is noteworthy for the fact that on 14 separate occasions he was able to raise a kite carrying self-recording meteorological instruments from the deck of the *Scotia*, and to deduce from the records obtained important results with regard to the rate of propagation of temperature changes from the surface to the upper air, showing that the distribution of temperature in height is due to the action of eddies and resembles the process of heat conductivity in its mode of operation. New results regarding fog at sea are also obtained. In four of the kite ascents there was no fog, and the temperature uniformly fell with height (positive temperature gradient). The other 10 cases were associated with negative temperature gradients, and in 9 of them fog was noted to be present. Fog production appears to depend upon the mixing by eddy conductivity of layers of different temperatures and humidities, rather than upon the cooling below the dew point of a homogeneous mass of air. With regard to the suggested detection of the presence of icebergs from their effect upon the temperature of the sea, the conclusion is reached that in the regions visited by the *Scotia* the results obtained do not bear out the suggestion.—*R. Corless.*

[1] Report to the Board of Trade, London, 1914, 141 p. 4°. Text.

RADIUM CONTENT OF WATER FROM GULF OF MEXICO.[1]

By S. J. LLOYD.

[Reprinted from Science Abstracts, Sec. A, July 26, 1915, § 863.]

The growing recognition of radium as an important factor in geological processes has led to a multiplication of analyses of rocks and soils for that substance. With the object of obtaining further evidence on the question of the distribution of radium in the ocean, which at a minimum estimate contains 1,000 tons of radium, the author has made a careful examination of the water of the Gulf of Mexico. The measurements were made in the usual type of vacuum emanation electroscope and the results, with those of other observers, are included in the following table:

Observer.	Sea.	Radium per liter of water.
		Grams.
Joly	Various oceans	17.0×10^{-12}
Eve (1907)	North Atlantic	0.3×10^{-12}
Do	do	0.9×10^{-12}
Satterly	English sea waters	1.0×10^{-12}
Lloyd	Gulf of Mexico	1.7×10^{-12}

Excluding Joly's abnormally high results, an average value for the radium content of 1 liter of sea water is 1.2×10^{-12} gm., representing a total amount of 1,400 tons in the sea. According to the author, 100 liters of sea water should contain from 0.3 to 0.5 milligram of uranium.—*A. B. Wood.*

[1] Amer. jour. sci., May, 1915, (4) 39:580-582.

DISCUSSION ON ANTARCTIC METEOROLOGY.[2]

This discussion was opened by G. C. Simpson, briefly summarizing the general circulation of the atmosphere in the Southern Hemisphere as given in the textbooks, in Lockyer's "Southern Hemisphere surface air circulation," and Meinardus's "Discussion of the results of the *Gauss* Antarctic expedition."

1. Dr. Lockyer suggests an intense anticyclone over Antarctica, from which cold air feeds into a series of large cyclones circulating the southern ocean and having their centers near latitude 60°S. The cyclones are supposed to be so large that while their southern extremities sweep over the edge of Antarctica their northern extremities reach to latitude 40°S., and so dominate the weather of Tasmania and New Zealand and to some extent that of South Australia.

[2] *Reprinted from* Report of the Eighty-fourth Meeting of the British Association for the Advancement of Science, Australia, 1914. London, 1915. p. 302.